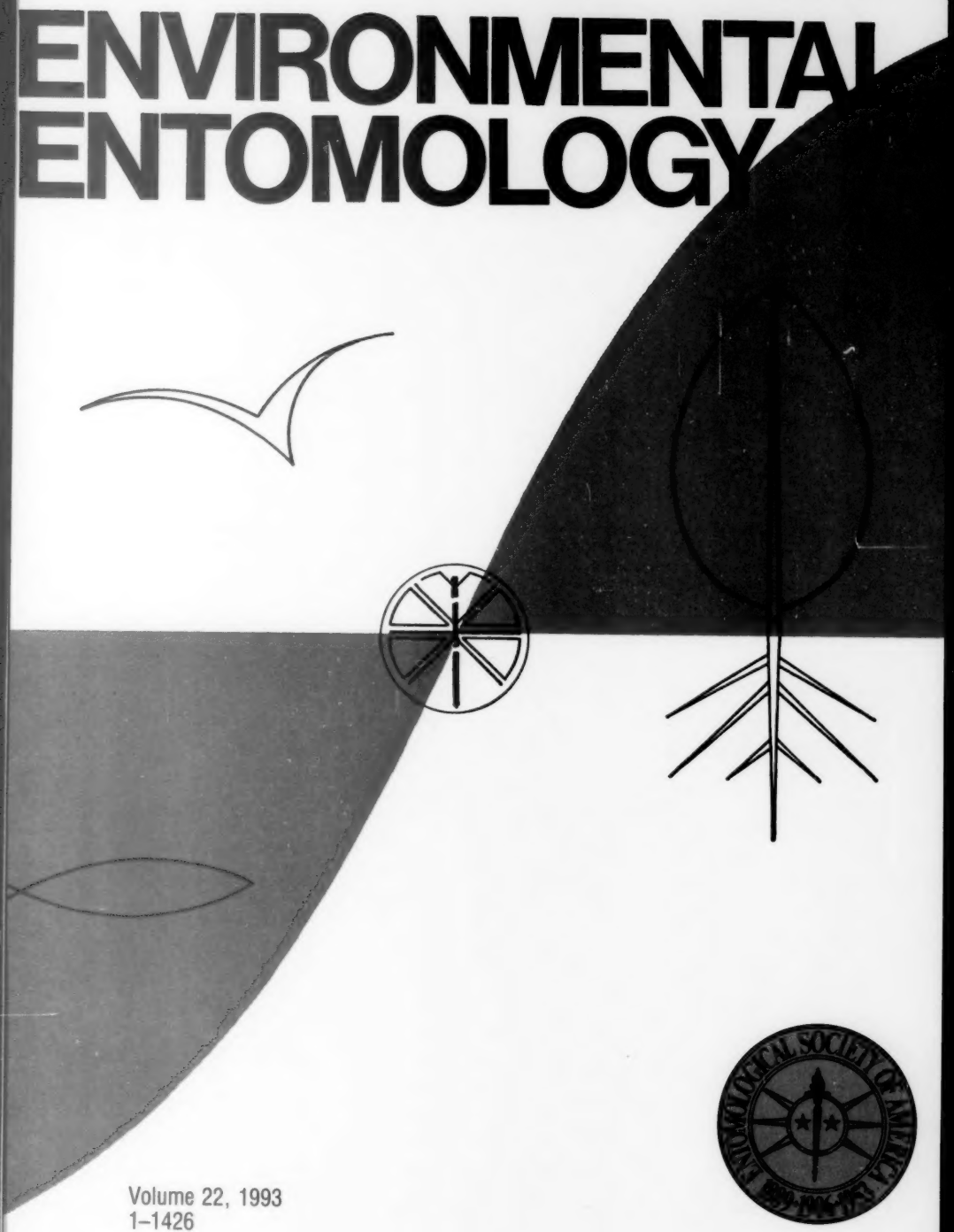
US ISSN 0046 225X

ENVIRONMENTAL ENTOMOLOGY



Volume 22, 1993
1–1426

Environmental Entomology

Volume 22
Number 6
December 1993

WILLIAM P. KEMP
Editor
RONALD E. STINNER
Editor

RICHARD S. ZACK
Book Review Editor
RAYMOND L. EVERNGAM, JR.
Assistant Director, Communications

RICHARD H. FOOTE
EILEEN D'ARAUJO
Copy Editors
THOMAS P. SHILLE
Production Editor

Editorial Board

C. J. JONES, *Chair*
Urbana, IL
Section D (1993)
C. LOUDON
Manhattan, KS
Section B (1994)
R. L. BRANDENBURG
Raleigh, NC
Section E (1995)
G. C. BROWN
Lexington, KY
Section F (1996)
H. R. BURKE
College Station, TX
Section A (1997)
J. R. FUXA
Baton Rouge, LA
Section C (1997)

Published by the
Entomological Society of America

F. W. KNAPP
Lexington, KY
President
F. T. TURPIN
West Lafayette, IN
Past President
G. L. TEETES
College Station, TX
President-Elect
J. H. SHADDY
Kirksville, MO
Secretary-Treasurer
M. B. STOETZEL
Beltsville, MD
Eastern Branch
K. L. STEFFEY
Champaign, IL
North Central Branch
K. S. PIKE
Prosser, WA
Pacific Branch
G. G. KENNEDY
Raleigh, NC
Southeastern Branch
T. W. FUCHS
San Angelo, TX
Southwestern Branch
B. J. HARRINGTON
Madison, WI
Section A
H. OBERLANDER
Gainesville, FL
Section B
M. E. IRWIN
Champaign, IL
Section C
E. PAUL CATTS
Pullman, WA
Section D
C. A. SUTHERLAND
Las Cruces, NM
Section E
M. K. HARRIS
College Station, TX
Section F
W. D. HANSEN
Lanham, MD
Executive Director

© 1993, Entomological Society of America

Environmental Entomology (ISSN 0046-225X) is published bimonthly (February, April, June, August, October, and December) by the Entomological Society of America, 9301 Annapolis Road, Lanham, MD 20706. The journal is printed by Allen Press, 1041 New Hampshire Street, P.O. Box 368, Lawrence, KS 66044. Second class postage is paid at Lanham, MD, and at additional mailing offices.

Postmaster: Send change of address forms to *Environmental Entomology*, ESA, 9301 Annapolis Road, Lanham, MD 20706.

Inquiries regarding content, subscriptions, advertising, availability of back issues, change of address, and general business matters, and manuscripts and other copy should be sent to the managing editor, ESA, 9301 Annapolis Road, Lanham, MD 20706. For information about the preparation of manuscripts, authors are urged to consult "Information for Contributors," which is printed on the inside back cover of most issues, or to send for *Publications Policies and Guide for Authors*, which is available free of charge from ESA.

Articles report the results of research only. Mention of a pesticide or a commercial or proprietary product does not constitute endorsement or recommendation for its use. Authors are entirely responsible for statements made, whether of fact or opinion. Registered names and trademarks, etc., used in this publication, even without specific indication thereof, are not to be considered unprotected by law.

Photocopies. Permission to photocopy journal articles for internal or personal use is granted by the Entomological Society of America provided that a fee is paid directly to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. Individuals may make a single copy for personal use without charge. This consent does not extend to other kinds of copying, such as that for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. The fee code for users of the Transaction Reporting Service is 0046-225X/93/$2.00.

Subscriptions. 1993 prices: members, $25; nonmember individuals, $75; institutions, $150. To the above add $20 for shipping outside the continental U.S. Send payment to EE Subscriptions, ESA, P.O. Box 177, Hyattsville, MD 20781. Inquiries should be directed to ESA Sales, 9301 Annapolis Road, Lanham, MD 20706; (301) 731-4535.

Back Issues	ESA member domestic	ESA member foreign	Non-member domestic	Non-member foreign
Single issue	$10.40	$11.40	$ 34.00	$ 35.00
Volume	62.40	68.40	204.00	210.00

All prices include handling and shipping by surface mail. For a list of available issues, write to ESA Sales, 9301 Annapolis Road, Lanham, MD 20706. Back volumes are available in microform from University Microfilms International, 300 North Zeeb Road, Ann Arbor, MI 48106.

CUMULATIVE AUTHOR INDEX

Environmental Entomology

Volume 22, 1993

A
Abrahamson, W. G., 388
Al-Obaidi, A. A., 1344
Albajes, R., 381
Albert, P. J., 824
Alford, A. R., 167
Allsopp, P. G., 10, 362, 1278
Altman, D. W., 1
Anderbrant, O., 445
Antonelli, A. L., 1302
Armbrust, E. J., 220
Armes, N. J., 339
Arpaia, S., 334
Asante, S. K., 1060
Atzeni, M. G., 368

B
Bacheler, J. E., 716
Ban, P. M., 1113
Barbercheck, M. E., 1166
Barnard, D. R., 971
Barrett, G. W., 541
Bartelt, R. J., 837
Beerwinkle, K. R., 554
Benedict, J. H., 1, 273
Beninger, C. W., 766
Bentley, M. D., 167
Berberet, R. C., 305
Berenbaum, M. R., 791
Bergh, J. C., 1325
Betts, L. L., 699
Bingaman, B. R., 397
Blumberg, D., 837
Bohls, R. A., 532
Boldt, P. E., 234
Bomar, C. R., 489
Bonjour, E. L., 1344
Borden, J. H., 319
Bourchier, R. S., 642
Bradley, D., 190
Brann, D. E., 1251
Brodsgaard, H. F., 647
Brose, P. H., 1118
Brown, J., 613
Brusven, M. A., 71, 1156
Bryan, M. D., 1234
Burger, T. L., 1234
Burlando, T. M., 859
Butterfield, C. H., 993

C
Cairns, S. C., 1060
Callan, N. W., 831
Cameron, E. A., 1118
Campbell, J. B., 212
Cannon, Jr., W. N., 669
Capinera, J. L., 127
Carpenter, J. E., 1084
Carruthers, R. I., 885, 1172
Cartwright, B., 1266
Cate, J. R., 99, 226, 1161
Center, T. D., 1146
Chang, Y. Z., 411
Christianssen, C. A., 311
Chun, Y. S., 1009
Clancy, K. M., 116
Clarke, G. M., 1362
Cloutier, C., 477
Cockfield, S. D., 607
Coffelt, M. A., 1318
Collins, A. M., 183
Colvin, D. L., 1043
Comas, J., 381
Comer, J. A., 613
Congdon, B. D., 1302
Cook, J. M., 1213
Cooter, R. J., 339
Cope, M.-L., 483
Corbett, A., 519
Cornell, H. V., 1294
Costa, H. S., 16
Coulson, R. N., 62
Craig, T. P., 388
Crist, T. O., 709
Croft, B. A., 865
Cuperus, G. W., 305

D
Dahlsten, D. L., 49
Danthanarayana, W., 1060
Day, W. H., 1234
DeAngelis, J. D., 1308
Dowdy, A. K., 965
Dray, Jr., F. A., 1146
Dunn, J. P., 948
Dutcher, J. D., 810, 1016
Dysart, R. J., 1234

E
Eckenrode, C. J., 559
Eddleman, B. R., 273
Edelson, J. V., 1266
Ellis, D. D., 190, 197
Elsey, K. D., 567
Epsky, N. D., 464, 942
Erlandson, C. M., 933
Espelie, K. E., 547
Evans, E. W., 1392

F
Fargo, W. S., 1344
Fay, P. A., 1333
Fereres, A., 1260
Ferguson, C. S., 595
Fescemyer, H. W., 933
Fielding, D. J., 71
Fields, P. G., 470
Fitzpatrick, S. M., 818
Flamm, R. O., 62
Flanangan, G. J., 254
Fleischer, S. J., 1124
Flint, H. M., 43
Follett, P. A., 283
Fornasari, L., 684
Foster, R. N., 532
French, J. D., 489
Fuxa, J. R., 425

G
Gabor, J. W., 1358
Gabriel, A. D., 679
Gannon, M. R., 634
Garcia, J. A., 1367
Gardescu, S., 843
Gaston, L. K., 920
Gaugler, R., 796
Geden, C. J., 971, 1201
Gemeno, C., 1260
Gerber, R. G., 920
Gerhardt, K. O., 162
Giblin-Davis, R. M., 93
Gillespie, T. J., 726
Gilmore, J. E., 404
Goldenberg, S., 837
Good, W. R., 831
Gould, F., 283
Grant, G. G., 154
Green, E. S., 791
Gribko, L. S., 1066
Grissell, E. E., 1313
Gross, H. R., 1084

H
Habeck, D. H., 1146
Hagstrum, D. W., 33
Hajek, A. E., 1172
Halaweish, F. T., 925
Hall, D. J., 154
Harbach, R. E., 978
Hare, J. D., 432
Harrell, M. O., 781
Harris, E. J., 404
Hart, E. R., 397
Haukioja, E., 438
Haynes, K. F., 109
Haysom, M.B.C., 1278
Head, G., 1096
Heath, R. R., 464, 942
Heinz, K. M., 1217
Herbert, Jr., D. A., 693, 1251
Hernandez, E. M., 99
Herrmann, D. P., 571
Hesler, L. S., 743
Higley, L. G., 311
Ho, C.-C., 21
Hoelmer, K. A., 49
Hoffmann, D. F., 1140
Hogmire, Jr., H. W., 716
Hohn, M. E., 1066
Holliday, N. J., 784
How, S. T., 388
Howard, R.W., 965
Hoy, C. W., 418, 1096
Hsu, C. L., 453
Hull, L. A., 716
Hunt, R. E., 109

J
Jacobson, D. A., 1338
Jansson, R. K., 88
Jenkins, M. J., 297
Jennings, D. T., 1003
Joern, A., 352
Johnson, F. A., 1043
Johnson, M. W., 16
Johnson, P. S., 993
Johnson, S. G., 477
Jones, C. J., 174
Jones, R. W., 99
Jones, T. A., 1022, 1349
Jonsson, P., 445
Judd, G.J.R., 1325

K
Kaakeh, W., 810, 1016
Karel, A. K., 1076
Katovich, S. A., 154
Kauffman, E. E., 459
Kaya, H. K., 859
Keaster, A. J., 162
Kehat, M., 837
Kemp, W. P., 501, 733
Kennedy, G. G., 283
Kepner, R. L., 532
Kharboutli, M. S., 663, 1134
Kingsley, P. C., 1234
Kinn, D. N., 1285
Kish, L. P., 1156
Klucas, G., 352
Knauft, D. A., 1043
Knudsen, G. R., 874
Kozlov, M. V., 438
Kring, T. J., 1338

L
Lachance, P., 1103
Lactin, D. J., 784
Lamari, L. L., 784
Lance, D. R., 654
Landivar, J. A., 273
Lanza, J., 411
Lapis, E. B., 3192
Larkin, T. S., 1172
Lavallee, R., 824
Legaspi, J. C., 1193
Legg, D. E., 733
Lemenager, D., 459
Leonard, J. G., 1108
Lessor, K.N.S.A., 154
Liebhold, A. M., 26, 1066
Lin, H., 1096
Lindqvist, L., 1355
Linit, M. J., 1285
Lockwood, J. A., 489, 503, 733, 904
Logan, P., 759
Lombardo, D. A., 154
Lopez, Jr., J. D., 554
Lord, C. C., 82
Lorio, Jr., P. L., 948
Lu, W., 759
Lynch, R. E., 375

M
MacRae, I. V., 865
Mack, T. P., 663, 802, 1134
Maddox, J. V., 220
Mahr, D. L., 607
Manguin, S., 978
Manning, J. S., 1140
Marino, P. C., 1294
Martinat, P. J., 1003
Mauffette, Y., 824
Mayer, D. G., 368
Mayse, M. A., 577
McAuslane, H. J., 1043
McCaffrey, J. P., 704
McCormick, L. H., 1118
McCown, B., 190, 197
McGaughey, W. H., 965
McKenzie, C. L., 1266
McMahon, M. J., 796
Meade, T., 432
Mendel, M. J., 167
Messina, F. J., 1022, 1349
Meyer, W. L., 1383
Midgarden, D. G., 1124, 1251
Miller, M., 190, 197
Miller, M. E., 1266
Milne, B. T., 709
Morales, J., 1092
Morales-Ramos, J. A., 226
Morgan, T. A., 1278
Morrill, W. L., 1358
Mulekar, M. S., 346
Murphy, J. A., 699

N
Nafus, D. M., 265
Nalepa, C. A., 1313
Naranjo, S. E., 1051
Nealis, V. G., 642
Nechols, J. R., 238
Nielson, D. C., 1022, 1349
Nixon, K. H., 1251
Nolan, M. A., 733
Nordin, G. L., 674
Novak, M. G., 311
Nunney, L., 1217
Nyomura, K., 43
Nyrop, J. P., 595

O
O'Neil, R. J., 1193
O'Neill, K. M., 751
O'Neill, R. P., 751
Obrycki, J. J., 679
Oloumi-Sadeghi, H., 220
Omer, A. D., 16
Onsager, J. A., 885, 1031
Ormord, A. M., 679
Orr, C. J., 679

P
Packham, S. O., 1156
Parajulee, M. N., 1035
Parker, B. L., 1108
Parks, N. J., 43
Parr, J. C., 109, 674
Parrella, M. P., 1217
Pass, B. C., 674
Pavuk, D. M., 541
Payton, M. E., 1344
Peairs, F. B., 1383
Pecor, J., 978
Perez, P., 1260
Perring, T. M., 915
Peyton, E. L., 978
Philips, T. W., 1035
Plant, R. E., 519
Pomerinke, M. A., 489
Pons, X., 381
Ponz, F., 1260
Pooler, P. D., 532
Poprawski, T. J., 1383
Powell, J. E., 693
Price, P. W., 116
Prokopy, R. J., 453
Pulim, S., 411
Pulley, P. E., 62
Purcell, M., 246

Q
Quinn, M. A., 532, 993

R
Raffa, K. F., 190, 197
Rajab, M. S., 167
Ramachandran, R., 190, 197
Rao, R. P., 134
Reimer, N. J., 483
Rejmankova, E., 978
Reuter, L. L., 915
Ricchiuto, B., 334
Richter, A. R., 425
Rinderer, T. E., 183
Ring, D. R., 1, 273
Risley, L. S., 57
Robacker, D. C., 1367
Roberts, D. R., 978
Roberts, S. J., 220
Rock, G. C., 716
Roden, D. B., 134
Roltsch, W. J., 577
Roques, A., 297
Rossignol, P. A., 1308
Rowley, W. A., 311
Ruberson, J. R., 1338
Rutz, D. A., 1201
Ryoo, M. I., 1009

S
Sacchi, C. F., 116
Sachs, E. S., 1
Samenus, Jr., R. J., 1333
Sandlin, E. A., 625, 634
Sappington, T. W., 141
Scheffrahn, R. H., 1113
Schenk, T. C., 33
Schroeder, P. C., 595
Schultz, P. B., 1318
Schuster, D. J., 1188
Schwalbe, C. P., 1234
Seal, D. R., 88
Seitz, L. M., 965
Sether, D. M., 1308
Seymour, R. C., 212
Shanks, Jr., C. H., 1302
Shaver, T. N., 554
Shields, E. J., 595
Shipp, J. L., 726
Shorey, H. H., 920
Showers, W. B., 141
Siegfried, B. D., 958
Simmons, A. M., 3752
Simons, E. E., 26
Sims, S. R., 1
Sior, A., 26
Sisk, C. B., 920
Sites, R. W., 571
Smith, Jr., J. W., 849
Smith, L., 618
Smith, S. M., 1375
Smitley, D. R., 134
Sobhian, R., 234, 684
Soper, R. S., 1172
Sosa, E. S., 99

Speese, J., 693
Stark, J. A., 305
Stark, J. D., 246
Steffey, K. L., 220
Steinkraus, D. C., 1201, 1338
Stevens, M. M., 776
Stinner, R. E., 716
Stone, T. B., 1
Story, J. M., 831
Straub, R. W., 559
Streett, D., 751, 1031, 1140
Strom, K. B., 1275
Su, N.-Y., 1113
Subramanyam, BH., 33
Sullivan, G. T., 1278
Sun, S., 699
Sutter, G. R., 743
Swallow, J. G., 1392

T
Tabashnik, B. E., 16
Tallamy, D. W., 925
Tauber, C. A., 8432
Tauber, M. J., 843
Tebbets, J. S., 1140
Thurston, G. S., 859
Tillman, P. G., 1161
Tipping, P. W., 1402
Toscano, N. C., 915
Trichilo, P. J., 802
Troubridge, J. T., 818

U
Uchida, G. K., 246
Ullman, D. E., 16
Unger, J. D., 26

V
Vail, P. V., 1140
Vargas, R. I., 246, 404, 453
Vargo, E. L., 411
Vaughn, T. T., 418
Velasco, L.R.I., 326
Villa, J. D., 183
Villani, M. G., 595
Vincent, C., 1103
Vogt, E. A., 238

W
Walgenbach, D. D., 532, 993
Walgenbach, J. F., 559
Walker, P. W., 10, 362
Walter, G. H., 326
Wang, Z. G., 874
Washino, R. K., 459
Weibull, J.H.W., 149
Weissling, T. J., 93
Wekesa, J. W., 459
Weseloh, R. M., 587
Wharton, R. A., 1188
Whitmore, R. C., 1003
Wichman, D., 1358
Wiedenmann, R. N., 849
Wiens, J. A., 709
Williams, R. N., 837
Willig, M. R., 571, 625, 634
Wilson, C. G., 254
Wilson, L. M., 704
Wilson, L. T., 802
Wiseman, B. R., 547
Wolf, D. D., 1318
Wood, D. L., 920
Woods, S. A., 751,1031
Wraight, S. P., 1383

Y
Yafuso, M., 601
Yamamoto, A. K., 43
Yang, G., 547
Yasuda, G., 483
Young, J. H., 346
Young, L. J., 346, 958
Youngman, R. R., 1124, 1251
Yuval, B., 459

Z
Zangerl, A. R., 791
Zehnder, G. W., 693
Zhu, Y., 162

CUMULATIVE SUBJECT INDEX
Environmental Entomology
Volume 22, 1993

2-SPRT, negative binomial distribution, 346
Sequential Probability Ratio Test, 346

A
Acer saccharum, forest soils, 1118
Taeniothrips inconsequens, 1118
Aceria malherbae, *Convolvulus arvensis*, 234
weeds, 234
Acrididae, nontarget organisms, 532
rangeland, 532
Aculus schlechtendali, competition, 865
Panonychus ulmi, 865
Acyrthosiphon pisum, cover crops, 1016
intrinsic rate of increase, 1016
Aedes spp., larval competition, 311
replacement series, 311
Aeneolamia varia, egg diapause, 1092
pest management, 1092
aggregation pheromones, *Carpophilus* spp., 837
host volatiles, 837
agroecosystem diversity, natural enemy enhancement, 519
vegetation management, 519
Agrotis ipsilon, Electroantennograms, 162
flight behavior, 141
flower volatiles, 162
migration, 141
air pollution, *Archips podana*, 438
population density, 438
Aleyrodes spiraeoides, malathion bait spray, 49
parasitoids, 49
alfalfa, artificial honeydew, 1392
biological control, 1392
allometry, body size, 1313
Megastigmus aculeatus nigroflavus, 1313
Alocasia odora, cross-pollinators, 601
synhospitalic Colocasiomyia flies, 601
Alternaria porri, plant disease-insect interaction, 1266
Thrips tabaci, 1266
American grasshopper, host preference, 127
Schistocerca, 127
amino acids, nectars, 411
Solenopsis spp., 411
Anagrapha falcifera, homologous cell lines, 1140
nuclear polyhedrosis, 1140
Anasa tristis, Cucurbitaceae, 1344
reproduction, 1344
Anastrepha ludens, attractants, 1367
food deprivation, 1367
Anastrepha suspensa, food availability, 942
light intensity, 464
pheromone periodicity, 464
pheromones, 942
animal excrement, attraction, 453
Ceratitis capitata, 453
Anisota senatoria, late-season defoliation, 1318
Quercus growth and vigor, 1318
Anopheles spp., aquatic vegetation, 978
larval habits, 978
ant repellants, *Formica aerata*, 920
pheromones, 920
Anthonomus grandis grandis, *Bracon mellitor*, 1161
host size, 1161
Anthonomus grandis, *Catolaccus grandis*, 226
developmental rates, 226
host plants, 99
pollen, 99
Anticarsia gemmatalis, biological control, 425
density, 933
development, 933
nuclear polyhedrosis virus, 425
antifeedants, *Bacillus thuringiensis*, 334
Spodoptera frugiperda, 167
synthetic model, 167
transgenic plants, 334
Antistrophus silphii, fire, 1333
mortality, 1333
antixenosis, *Heteropsylla cubana*, 319
Leucaena, 319
Aphididae, defoliation, 1349
Diuraphis noxia, 1349
Diuraphis, 1022
grass phenology, 1022
Aphis, *Myzus persicae*, 1260
vector propensity, 1260
Apis mellifera, overwintering, 183
temperature, 183
apple, *Eriosoma lanigerum*, 1060
spatial distribution, 1060
aquatic insects, detoxification enzymes, 958
pyrethroids, 958
aquatic vegetation, *Anopheles* spp., 978
larval habits, 978
Arachnida, *Epitrimerus pyri*, 1325
phenology, 1325
Archips podana, air pollution, 438
population density, 438
artificial honeydew, alfalfa, 1392
biological control, 1392
atmospheric deposition, growth, 669
Lymantria dispar, 669
attractant, *Diabrotica virgifera virgifera*, 654
western corn rootworm, 654
attractants, *Anastrepha ludens*, 1367
food deprivation, 1367
attraction, animal excrement, 453
Ceratitis capitata, 453

B
Bacillus thuringiensis, antifeedants, 334
Choristoneura fumiferana, 197
host plant resistance, 432
Hyphantria cunea, 197
Populus, 190
Spodoptera exigua, 432
transgenic insect resistance, 190
transgenic plants, 334
Bactrocera (=Dacus) dorsalis, parasitoids, 246
population dynamics, 246
bait stations, seedcorn maggot, 1251
wireworms, 1251
barrier band, *Lymantria dispar*, 587
sugar spray, 587
Bathyplectes spp., *Hypera postica*, 220, 674
Zoophthora phytonomi, 220, 674
behavior, cranberry, 607
Lepidoptera, 607
olfactory responses, 1096
Plutella xylostella, 1096
Bemisia tabaci, esterase banding patterns, 16
parasitoids, 1043
peanuts, 375, 1043
sweetpotato whitefly, 375
Trialeurodes vaporariorum, 16
benefit-cost analysis, environmental safety, 904
neoclassical biological control, 904
bigheaded ant, green scale, 483
natural enemies, 483
binomial sampling, rangelands, 733
survey, 733
biological control, alfalfa, 1392
Anticarsia gemmatalis, 425
artificial honeydew, 1392
biotic mortality, 679
bird predation, 489
Chrysoperla, 843
Cotesia flavipes, 849

Culicidae, 174
Entomophthora muscae, 1201
fecundity, 174
functional response, 849
grasshoppers, 885
host plant resistance, 238
Hypera postica, 1234
Hypolimnas, 265
Liriomyza, 1188
Lyctocoris campestris, 1035
Malacosoma disstria, 1375
mass-rearing, 843
Musca domestica, 1201
natural enemies, 885
nontarget species, 265
nuclear polyhedrosis virus, 425
parasite, 503, 1234
pathogen, 503
pest management, 1188
phytophagous insects, 254
rangeland weeds, 704
Salvia aethiopis, 704
Scelio opacus, 489
stored-product, 1035
strawberry, 679
tri-trophic interactions, 238
Trichogramma minutum, 1375
Xanthium occidentale, 254
biotic mortality, biological control, 679
strawberry, 679
biotypes, cabbage maggot, 559
Delia radicum, 559
bird predation, biological control, 489
Scelio opacus, 489
body size, allometry, 1313
cannibalism, 751
interspecific competition, 751
Megastigmus aculeatus nigroflavus, 1313
Bombus sp., metal concentration, 1355
Psithyrus sp., 1355
Bracon mellitor, *Anthonomus grandis grandis*, 1161
host size, 1161
Bursaphelenchus xylophilus, *Dendroctonus frontalis*, 1285
preformed defenses, 1285

C

cabbage maggot, biotypes, 559
Delia radicum, 559
Callosobruchus chinensis, oviposition, 1009
parasitism, 1009
Canada thistle, *Cassida rubiginosa*, 1402
insecta, 1402
cannibalism, body size, 751
interspecific competition, 751
Carpophilus spp., aggregation pheromones, 837
host volatiles, 837
Cassida rubiginosa, Canada thistle, 1402
insecta, 1402
Catolaccus grandis, *Anthonomus grandis*, 226
developmental rates, 226
Cauchy distribution, *Cochliomyia hominivorax*, 368
dispersal, 368
Centaurea solstitialis, weed control, 684
weevil, 684
Cephus cinctus, IPM, 1358
supercooling, 1358
Ceratitis capitata, animal excrement, 453
attraction, 453
distribution, 404
seasonality, 404
cereals, overwintering, 381
Sitobion avenae, 381
Chironomus tepperi, development, 776
morphometrics, 776
Choristoneura fumiferana, *Bacillus thuringiensis*, 197
Hyphantria cunea, 197
Chrysomela scripta, phenolic glycosides, 397
Populus, 397
Chrysopa perla, developmental stability, 1362
pollution, 1362
Chrysoperla, biological control, 843
mass-rearing, 843
Cochliomyia hominivorax, Cauchy distribution, 368
dispersal, 368
cold hardiness, *Frankliniella occidentalis*, 647
supercooling, 647
cold tolerance, *Nezara viridula*, 567
overwintering, 567
Coleoptera, nucleation, 470
stored products, 470
colonization, insect guilds, 62
Scolytidae, 62
Colorado potato beetle larva, feeding, 784
temperature dependence, 784
community structure, seral plant communities, 71
species diversity, 71
competition, *Aculus schlechtendali*, 865
grasshopper, 352
Panonychus ulmi, 865
sandhills grassland, 352
cone damage, *Larix decidua*, 297
Strobilomyia spp., 297
Convolvulus arvensis, *Aceria malherbae*, 234
weeds, 234
corn, development, 88
Euxesta stigmatis, 88
Helicoverpa zea, 1338
pupa mortality, 1338
corn earworm, diapause, 693
Microplitis croceipes, 693
cost, *Depressaria pastinacella*, 791
silk, 791
Cotesia flavipes, biological control, 849
functional response, 849
cover crops, *Acyrthosiphon pisum*, 1016
intrinsic rate of increase, 1016
cranberry, behavior, 607
Lepidoptera, 607
critical thermal maxima, cuticular permeability, 663
lethal water loss, 663
cross-pollinators, *Alocasia odora*, 601
synhospitalic Colocasiomyia flies, 601
crucifer, host preference, 418
Phyllotreta cruciferae, 418
Cucurbitaceae, *Anasa tristis*, 1344
reproduction, 1344
cucurbitacins, *Diabrotica undecimpunctata howardi*, 925
phagostimulation, 925
Culicidae, biological control, 174
fecundity, 174
habitat choice, 459
size variation, 459
current velocity, lotic ecology, 571
substratum size, 571
cuticular permeability, critical thermal maxima, 663
lethal water loss, 663

D

dallisgrass ergot, feeding attractant, 554
Helicoverpa zea, 554
defoliation, Aphididae, 1349
Diuraphis noxia, 1349
Delia radicum, biotypes, 559
cabbage maggot, 559
Dendroctonus frontalis, *Bursaphelenchus xylophilus*, 1285
drought, 948
plant defense, 948
preformed defenses, 1285
density, *Anticarsia gemmatalis*, 933
development, 933
Musca domestica, 971
temperature, 971
Depressaria pastinacella, cost, 791
silk, 791
detoxification enzymes, aquatic insects, 958
pyrethroids, 958
development, *Anticarsia gemmatalis*, 933

Chironomus tepperi, 776
corn, 88
density, 933
Euxesta stigmatis, 88
morphometrics, 776
Pinus strobus, 824
Pissodes strobi, 824
developmental rates,
Anthonomus grandis, 226
Catolaccus grandis, 226
developmental stability,
Chrysopa perla, 1362
pollution, 1362
Diabrotica undecimpunctata howardi, cucurbitacins, 925
parasite-prey interactions, 1166
phagostimulation, 925
southern corn rootworm, 1166
Diabrotica virgifera virgifera, attractant, 654
geostatistics, 1124
sampling, 1124
western corn rootworm, 654
Diabrotica spp., toxic-bait dispensers, 743
trapping, 743
diapause, corn earworm, 693
Microplitis croceipes, 693
diflubenzuron, nontarget effects, 1003
Orthoptera, 1003
Diglyphus begini, *Liriomyza trifolii*, 1217
simulation model, 1217
Dioryctria ponderosae, *Dioryctria tumicolella*, 781
susceptibility, 781
Dioryctria resinosella, sex pheromones, 154
trapping, 154
Dioryctria tumicolella, *Dioryctria ponderosae*, 781
susceptibility, 781
diploid male, parasitoid, 1213
rearing, 1213
discriminant analysis, economic thresholds, 305
Hypera postica, 305
dispersal, Cauchy distribution, 368
Cochliomyia hominivorax, 368
dispersion, mulberry, 21
sequential sampling, 802
Spissistilus festinus, 802
Tetranychus kanzawai, 21
distribution, *Ceratitis capitata*, 404
seasonality, 404
Diuraphis noxia, Aphididae, 1349
defoliation, 1349
fecundity, 874
microbial control, 874
parasitoids, 1383
pathogens, 1383
Diuraphis, Aphididae, 1022
grass phenology, 1022
diurnal resting shelter,
Lutzomyia shannoni, 613
tree hole, 613
drought, *Dendroctonus frontalis*, 948
plant defense, 948

E

ecological genetics, resistance management, 283
simulation model, 283
economic injury level, physiological age, 273
response surface, 273
economic thresholds, discriminant analysis, 305
Hypera postica, 305
egg diapause, *Aeneolamia varia*, 1092
pest management, 1092
egg mass, Lymantriidae, 26
sampling, 26
egg predation, *Nicrophorus vespilloides*, 766
Poecilochirus carabi, 766
Electroantennograms, *Agrotis ipsilon*, 162
flower volatiles, 162
electronic monitoring system, feeding behavior modification, 915
Myzus persicae, 915
Eleodes spp., fractals, 709
movements, 709
emergence, hover, 796
Tabanus, 796
endophyte, *Festuca arundinacea*, 699
Sphenophorus spp., 699
Entomophaga calopteni, fungus infections, 1156
Melanoplus spp., 1156
Entomophaga maimaiga, epizootiology, 1172
Lymantria dispar, 1172
Entomophthora muscae, biological control, 1201
Musca domestica, 1201
environmental safety, benefit-cost analysis, 904
neoclassical biological control, 904
Epitrimerus pyri, Arachnida, 1325
phenology, 1325
epizootiology, *Entomophaga maimaiga*, 1172
Lymantria dispar, 1172
Microsporidia, 1031
vertical transmission, 1031
Eriosoma lanigerum, apple, 1060
spatial distribution, 1060
esterase banding patterns,
Bemisia tabaci, 16
Trialeurodes vaporariorum, 16
Eumargarodes laingi,
margarodids, 362
Promargarodes spp., 10, 362
sampling, 10
Eurosta solidaginis, galls, 388
host plant phenology, 388
Euxesta stigmatis, corn, 88
development, 88

F

fecundity, biological control, 174
Culicidae, 174
Diuraphis noxia, 874
microbial control, 874
feeding, Colorado potato beetle larva, 784
induction, 759
Leptinotarsa decemlineata, 759
temperature dependence, 784
feeding attractant, dallisgrass ergot, 554
Helicoverpa zea, 554
feeding behavior modification, electronic monitoring system, 915
Myzus persicae, 915
feeding rate, functional responses, 1134
Labidura riparia, 1134
Festuca arundinacea, endophyte, 699
Sphenophorus spp., 699
fire, *Antistrophus silphii*, 1333
mortality, 1333
flight behavior, *Agrotis ipsilon*, 141
migration, 141
flight mill, *Helicoverpa armigera*, 339
insect flight, 339
flower volatiles, *Agrotis ipsilon*, 162
Electroantennograms, 162
food availability, *Anastrepha suspensa*, 942
pheromones, 942
food deprivation, *Anastrepha ludens*, 1367
attractants, 1367
foraging, *Reticulitermes flavipes*, 1113
territories, 1113
forest soils, *Acer saccharum*, 1118
Taeniothrips inconsequens, 1118
Formica aerata, ant repellants, 920
pheromones, 920
fractals, *Eleodes* spp., 709
movements, 709
Frankliniella occidentalis, cold hardiness, 647
generalist predators, 477
impatiens necrotic spot virus, 1308
life tables, 1308
supercooling, 647
temperature, 726

Tetranychus urticae, 477
vapor pressure deficit, 726
fruit insects, modeling, 716
phenology, 716
functional responses, biological control, 849
Cotesia flavipes, 849
feeding rate, 1134
Labidura riparia, 1134
fungus infections, *Entomophaga calopteni*, 1156
Melanoplus spp., 1156

G
galls, *Eurosta solidaginis*, 388
host plant phenology, 388
generalist predators, *Frankliniella occidentalis*, 477
Tetranychus urticae, 477
genetically modified cotton, plant resistance, 1
transgenic cotton, 1
geostatistics, *Diabrotica virgifera virgifera*, 1124
sampling, 1124
gossyplure, *Pectinophora gossypiella*, 43
pheromones, 43
Graminella nigrifrons, insect vectors, 109
plant pathogens, 109
grass phenology, Aphididae, 1022
Diuraphis, 1022
grasses, herbivory, 993
Melanoplus sanguinipes, 993
grasshoppers, biological control, 885
competition, 352
natural enemies, 885
sandhills grassland, 352
green scale, bigheaded ant, 483
natural enemies, 483
growth, atmospheric deposition, 669
Lymantria dispar, 669
reproduction, 149
Rhopalosiphum padi, 149
growth rates, *Lymantria dispar*, 642
tannins, 642
habitat choice, Culicidae, 459
size variation, 459

H
Harrisina brillians, phenology, 577
phenology model, 577
Helicoverpa armigera, flight mill, 339
insect flight, 339
Helicoverpa zea, corn, 1338
dallisgrass ergot, 554
feeding attractant, 554
inherited sterility, 1084
pupa mortality, 1338
substerile males, 1084
Heliothis armigera, intercropping, 1076
Maruca testulalis, 1076
Hepialidae, sampling, 1108
sticky trap, 1108
herbivory, grasses, 993
Lamponius portoricensis, 625
leaf abscission, 57
litterfall, 57
Melanoplus sanguinipes, 993
nutrient constraints, 625
Heteropsylla cubana, antixenosis, 319
Leucaena, 319
Heterorhabditis bacteriophora, insect-entomopathogenic nematode interactions, 595
Nematoda, 859
Popillia japonica, 595
Steinernema carpocapsae, 859
homologous cell lines, *Anagrapha falcifera*, 1140
nuclear polyhedrosis, 1140
host plant phenology, *Eurosta solidaginis*, 388
galls, 388
host plant resistance, *Bacillus thuringiensis*, 432
biological control, 238
larval behavior, 547
Spodoptera exigua, 432
Spodoptera frugiperda, 547
tri-trophic interactions, 238
host plants, *Anthonomus grandis*, 99
pollen, 99
host preference, American grasshopper, 127
crucifer, 418
Lymantria dispar, 134
Phyllotreta cruciferae, 418
Schistocerca, 127
trunk, 134
host size, *Anthonomus grandis grandis*, 1161
Bracon mellitor, 1161
host switching, *Nezara viridula*, 326
survival, 326
host volatiles, aggregation pheromones, 837
Carpophilus spp., 837
hover, emergence, 796
Tabanus, 796
Hypera postica, *Bathyplectes* spp., 220, 674
biological control, 1234
discriminant analysis, 305
economic thresholds, 305
parasite, 1234
Zoophthora phytonomi, 220, 674
Hyphantria cunea, *Bacillus thuringiensis*, 197
Choristoneura fumiferana, 197
Hypolimnas, biological control, 265
nontarget species, 265

I
impatiens necrotic spot virus, *Frankliniella occidentalis*, 1308
life tables, 1308
induction, feeding, 759
Leptinotarsa decemlineata, 759
inherited sterility, *Helicoverpa zea*, 1084
substerile males, 1084
insect flight, flight mill, 339
Helicoverpa armigera, 339
insect guilds, colonization, 62
Scolytidae, 62
insect pheromones, *Rhyzopertha dominica*, 965
wheat grain volatiles, 965
insect vectors, *Graminella nigrifrons*, 109
plant pathogens, 109
insect-entomopathogenic nematode interactions, *Heterorhabditis bacteriophora*, 595
Popillia japonica, 595
insecta, Canada thistle, 1402
Cassida rubiginosa, 1402
intercropping, *Heliothis armigera*, 1076
Maruca testulalis, 1076
interspecific competition, body size, 751
cannibalism, 751
intrinsic rate of increase, *Acyrthosiphon pisum*, 1016
cover crops, 1016
IPM, *Cephus cinctus*, 1358
supercooling, 1358
Ixodes dammini, mortality, 82
New York, 82

K
kriging, *Lymantria dispar*, 1066
variogram, 1066

L
Labidura riparia, feeding rate, 1134
functional responses, 1134
Lamponius portoricensis, herbivory, 625
nutrient constraints, 625
plant apparency, 634
understory, 634
Larix decidua, cone damage, 297
Strobilomyia spp., 297
larval behavior, host plant resistance, 547
Spodoptera frugiperda, 547
larval habits, *Anopheles* spp., 978
aquatic vegetation, 978
larval competition, *Aedes* spp., 311
replacement series, 311

late-season defoliation, *Anisota senatoria*, 1318
Quercus growth and vigor, 1318
leaf abscission, herbivory, 57
litterfall, 57
leaf area, natural enemies, 116
Pontania sp. nr. pacifica, 116
leaf phenology, oviposition, 1294
Phytomyza ilicicola, 1294
Lepidoptera, behavior, 607
cranberry, 607
Leptinotarsa decemlineata, feeding, 759
induction, 759
lethal water loss, critical thermal maxima, 663
cuticular permeability, 663
Leucaena, antixenosis, 319
Heteropsylla cubana, 319
life history, parasitoid, 618
Pectinophora gossypiella, 1051
Podisus maculiventris, 1193
predation, 1193
relative humidity, 618
Trichogrammatoidea bactrae, 1051
life tables, *Frankliniella occidentalis*, 1308
impatiens necrotic spot virus, 1308
light intensity, *Anastrepha suspensa*, 464
pheromone periodicity, 464
Liriomyza trifolii, *Diglyphus begini*, 1217
simulation model, 1217
Liriomyza, biological control, 1188
pest management, 1188
litterfall, herbivory, 57
leaf abscission, 57
lotic ecology, current velocity, 571
substratum size, 571
Lutzomyia shannoni, diurnal resting shelter, 613
tree hole, 613
Lyctocoris campestris, biological control, 1035
stored-product, 1035
Lymantria dispar, atmospheric deposition, 669
barrier band, 587
Entomophaga maimaiga, 1172
epizootiology, 1172
growth, 669
growth rates, 642
host preference, 134
kriging, 1066
sugar spray, 587
tannins, 642
trunk, 134
variogram, 1066
Lymantriidae, egg mass, 26
sampling, 26

M

Malacosoma disstria, biological control, 1375
Trichogramma minutum, 1375
malathion bait spray, *Aleyrodes spiraeoides*, 49
parasitoids, 49
margarodids, *Eumargarodes laingi*, 362
Promargarodes spp., 362
Maruca testulalis, *Heliothis armigera*, 1076
intercropping, 1076
mass-rearing, biological control, 843
Chrysoperla, 843
Megastigmus aculeatus nigroflavus, allometry, 1313
body size, 1313
Melanocallis caryaefoliae, *Monelliopsis pecanis*, 810
pecan, 810
Melanoplus sanguinipes, grasses, 993
herbivory, 993
Melanoplus spp., *Entomophaga calopteni*, 1156
fungus infections, 1156
metal concentration, *Bombus* sp., 1355
Psilyrus sp., 1355
microbial control, *Diuraphis noxia*, 874
fecundity, 874
Microplitis croceipes, corn earworm, 693
diapause, 693
Microsporidia, epizootiology, 1031
vertical transmission, 1031
migration, *Agrotis ipsilon*, 141
flight behavior, 141
modeling, fruit insects, 716
phenology, 716
stored-grain ecosystem, 33
trapping, 33
Monelliopsis pecanis, *Melanocallis caryaefoliae*, 810
pecan, 810
morphometrics, *Chironomus tepperi*, 776
development, 776
mortality, *Antistrophus silphii*, 1333
fire, 1333
Ixodes dammini, 82
New York, 82
movements, *Eleodes* spp., 709
fractals, 709
mulberry, dispersion, 21
Tetranychus kanzawai, 21
Musca domestica, biological control, 1201
density, 971
Entomophthora muscae, 1201
temperature, 971
Myzus persicae, *Aphis*, 1260
electronic monitoring system, 915
feeding behavior modification, 915
vector propensity, 1260

N

natural enemies, bigheaded ant, 483
biological control, 885
grasshoppers, 885
green scale, 483
leaf area, 116
Pontania sp. nr. pacifica, 116
natural enemy enhancement, agroecosystem diversity, 519
vegetation management, 519
nectars, amino acids, 411
Solenopsis spp., 411
negative binomial distribution, 2-SPRT, 346
Sequential Probability Ratio Test, 346
Nematoda, *Heterorhabditis bacteriophora*, 859
Steinernema carpocapsae, 859
neoclassical biological control, benefit-cost analysis, 904
environmental safety, 904
Neodiprion sertifer, pheromone traps, 445
pine sawfly, 445
New York, *Ixodes dammini*, 82
mortality, 82
Nezara viridula, cold tolerance, 567
host switching, 326
Nezara viridula, overwintering, 567
survival, 326
Nicrophorus vespilloides, egg predation, 766
Poecilochirus carabi, 766
nontarget effects, diflubenzuron, 1003
Orthoptera, 1003
nontarget organisms, Acrididae, 532
rangeland, 532
nontarget species, biological control, 265
Hypolimnas, 265
nuclear polyhedrosis, *Anagrapha falcifera*, 1140
homologous cell lines, 1140
nuclear polyhedrosis virus, *Anticarsia gemmatalis*, 425
biological control, 425
nucleation, Coleoptera, 470
stored products, 470
nutrient constraints, herbivory, 625
Lamponius portoricensis, 625

O

olfactory responses, behavior, 1096
Plutella xylostella, 1096
Orthoptera, diflubenzuron, 1003
nontarget effects, 1003

overwintering, *Apis mellifera*, 183
cereals, 381
cold tolerance, 567
Nezara viridula, 567
Sitobion avenae, 381
temperature, 183
oviposition, *Callosobruchus chinensis*, 1009
leaf phenology, 1294
parasitism, 1009
Phytomyza ilicicola, 1294

P
Panonychus ulmi, *Aculus schlechtendali*, 865
competition, 865
parasite, biological control, 503, 1234
Hypera postica, 1234
pathogen, 503
parasite-prey interactions, *Diabrotica undecimpunctata howardi*, 1166
southern corn rootworm, 1166
parasitism, *Callosobruchus chinensis*, 1009
oviposition, 1009
parasitoids, *Aleyrodes spiraeoides*, 49
Bactrocera (=Dacus) dorsalis, 246
Bemisia tabaci, 1043
diploid male, 1213
Diuraphis noxia, 1383
life history, 618
malathion bait spray, 49
pathogens, 1383
peanuts, 1043
Plathypena scabra, 541
population dynamics, 246
Pteromalidae, 212
rearing, 1213
relative humidity, 618
soybean, 541
Staphylinidae, 212
pathogens, biological control, 503
Diuraphis noxia, 1383
parasite, 503
parasitoids, 1383
peanuts, *Bemisia tabaci*, 375, 1043
parasitoids, 1043
sweetpotato whitefly, 375
pecan, *Melanocallis caryaefoliae*, 810
Monelliopsis pecanis, 810
Pectinophora gossypiella, gossyplure, 43
life history, 1051
pheromones, 43
Trichogrammatoidea bactrae, 1051
pest management, *Aeneolamia varia*, 1092
biological control, 1188
egg diapause, 1092
Liriomyza, 1188
phagostimulation, cucurbitacins, 925
Diabrotica undecimpunctata howardi, 925
phenolic glycosides, *Chrysomela scripta*, 397
Populus, 397
phenology, Arachnida, 1325
Epitrimerus pyri, 1325
fruit insects, 716
Harrisina brillians, 577
modeling, 716
phenology model, 577
phenology model, *Harrisina brillians*, 577
phenology, 577
pheromone periodicity, *Anastrepha suspensa*, 464
light intensity, 464
pheromone traps, *Neodiprion sertifer*, 445
pine sawfly, 445
pheromones, *Anastrepha suspensa*, 942
ant repellants, 920
food availability, 942
Formica aerata, 920
gossyplure, 43
Pectinophora gossypiella, 43
Phyllotreta cruciferae, crucifer, 418
host preference, 418
physiological age, economic injury level, 273
response surface, 273
Phytomyza ilicicola, leaf phenology, 1294
oviposition, 1294
phytophage, *Pistia stratiotes*, 1146
zoogeography, 1146
phytophagous insects, biological control, 254
Xanthium occidentale, 254
pine sawfly, *Neodiprion sertifer*, 445
pheromone traps, 445
Pinus strobus, development, 824
Pissodes strobi, 824
Pissodes strobi, development, 824
Pinus strobus, 824
Pistia stratiotes, phytophage, 1146
zoogeography, 1146
plant apparency, *Lamponius portoricensis*, 634
understory, 634
plant defense, *Dendroctonus frontalis*, 948
drought, 948
plant disease-insect interaction, *Alternaria porri*, 1266
Thrips tabaci, 1266
plant pathogens, *Graminella nigrifrons*, 109
insect vectors, 109
plant resistance, genetically modified cotton, 1
transgenic cotton, 1
Plathypena scabra, parasitoids, 541
soybean, 541
Plutella xylostella, behavior, 1096
olfactory responses, 1096
Podisus maculiventris, life history, 1193
predation, 1193
Poecilochirus carabi, egg predation, 766
Nicrophorus vespilloides, 766
pollen, *Anthonomus grandis*, 99
host plants, 99
pollution, *Chrysopa perla*, 1362
developmental stability, 1362
Pontania sp. nr. pacifica, leaf area, 116
natural enemies, 116
Popillia japonica, *Heterorhabditis bacteriophora*, 595
insect-entomopathogenic nematode interactions, 595
population density, air pollution, 438
Archips podana, 438
population dynamics, *Bactrocera (=Dacus) dorsalis*, 246
parasitoids, 246
population levels, *Saccharicoccus sacchari*, 1278
soil factors, 1278
Populus, *Bacillus thuringiensis* subsp. HD-, 190
Chrysomela scripta, 397
phenolic glycosides, 397
transgenic insect resistance, 190
predation, life history, 1193
Podisus maculiventris, 1193
preformed defenses, *Bursaphelenchus xylophilus*, 1285
Dendroctonus frontalis, 1285
Promargarodes spp., *Eumargarodes laingi*, 10, 362
margarodids, 362
sampling, 10
Psityrus sp., *Bombus* sp., 1355
metal concentration, 1355
Pteromalidae, parasitoids, 212
Staphylinidae, 212
pupa mortality, corn, 1338
Helicoverpa zea, 1338
pyrethroids, aquatic insects, 958
detoxification enzymes, 958

Q
Quercus growth and vigor, *Anisota senatoria*, 1318
late-season defoliation, 1318

R
rangelands, Acrididae, 532
binomial sampling, 733
nontarget organisms, 532
survey, 733

rangeland weeds, biological control, 704
Salvia aethiopis, 704
raspberry, spider mites, 1302
Stethorus punctum picipes, 1302
rearing, diploid male, 1213
parasitoid, 1213
relative humidity, life history, 618
parasitoid, 618
replacement series, *Aedes* spp., 311
larval competition, 311
reproduction, *Anasa tristis*, 1344
Cucurbitaceae, 1344
growth, 149
Rhopalosiphum padi, 149
reproductive potential, *Rhopobota naevana*, 818
Vaccinium macrocarpon, 818
resistance management, ecological genetics, 283
simulation model, 283
response surface, economic injury level, 273
physiological age, 273
Reticulitermes flavipes, foraging, 1113
territories, 1113
Rhopalosiphum padi, growth, 149
reproduction, 149
Rhopobota naevana, reproductive potential, 818
Vaccinium macrocarpon, 818
Rhynchophorus cruentatus, water loss, 93
water relations, 93
Rhyzopertha dominica, insect pheromones, 965
wheat grain volatiles, 965

S

Saccharicoccus sacchari, population levels, 1278
soil factors, 1278
Salvia aethiopis, biological control, 704
rangeland weeds, 704
sampling, *Diabrotica virgifera virgifera*, 1124
egg mass, 26
Eumargarodes laingi, 10
geostatistics, 1124
Hepialidae, 1108
Lymantriidae, 26
Promargarodes spp., 10
sticky trap, 1108
sandhills grassland, competition, 352
grasshopper, 352
Scelio opacus, biological control, 489
bird predation, 489
Schistocerca, American grasshopper, 127
host preference, 127
Scolytidae, colonization, 62
insect guilds, 62
seasonality, *Ceratitis capitata*, 404
distribution, 404
seedcorn maggot, bait stations, 1251
wireworms, 1251
Sequential Probability Ratio Test, 2-SPRT, 346
negative binomial distribution, 346
sequential sampling, dispersion, 802
Spissistilus festinus, 802
seral plant communities, community structure, 71
species diversity, 71
sex pheromones, *Dioryctria resinosella*, 154
trapping, 154
silk, cost, 791
Depressaria pastinacella, 791
simulation model, *Diglyphus begini*, 1217
ecological genetics, 283
Liriomyza trifolii, 1217
resistance management, 283
Sitobion avenae, cereals, 381
overwintering, 381
size variation, Culicidae, 459
habitat choice, 459
soil factors, population levels, 1278
Saccharicoccus sacchari, 1278
Solenopsis spp., amino acids, 411
nectars, 411
southern corn rootworm, *Diabrotica undecimpunctata howardi*, 1166
parasite-prey interactions, 1166
soybean, parasitoids, 541
Plathypena scabra, 541
spatial distribution, apple, 1060
Eriosoma lanigerum, 1060
species diversity, community structure, 71
seral plant communities, 71
Sphenophorus spp., endophyte, 699
Festuca arundinacea, 699
spider mites, raspberry, 1302
Stethorus punctum picipes, 1302
Spissistilus festinus, dispersion, 802
sequential sampling, 802
Spodoptera exigua, *Bacillus thuringiensis*, 432
host plant resistance, 432
Spodoptera frugiperda, antifeedants, 167
host plant resistance, 547
larval behavior, 547
synthetic model, 167
Staphylinidae, parasitoids, 212
Pteromalidae, 212
Steinernema carpocapsae, *Heterorhabditis bacteriophora*, 859
Nematoda, 859
Stethorus punctum picipes, raspberry, 1302
spider mites, 1302
sticky trap, Hepialidae, 1108
sampling, 1108
stored products, Coleoptera, 470
nucleation, 470
stored-grain ecosystem, modeling, 33
trapping, 33
stored-product, biological control, 1035
Lyctocoris campestris, 1035
strawberry, biological control, 679
biotic mortality, 679
tarnished plant bug, 1103
vacuum, 1103
Strobilomyia spp., cone damage, 297
Larix decidua, 297
substerile males, *Helicoverpa zea*, 1084
inherited sterility, 1084
substratum size, current velocity, 571
lotic ecology, 571
sugar spray, barrier band, 587
Lymantria dispar, 587
supercooling, *Cephus cinctus*, 1358
cold hardiness, 647
Frankliniella occidentalis, 647
IPM, 1358
Urophora affinis, 831
Urophora quadrifasciata, 831
survey, binomial sampling, 733
rangelands, 733
survival, host switching, 326
Nezara viridula, 326
susceptibility, *Dioryctria ponderosae*, 781
Dioryctria tumicolella, 781
sweetpotato whitefly, *Bemisia tabaci*, 375
peanut, 375
synhospitalic Colocasiomyia flies, *Alocasia odora*, 601
cross-pollinators, 601
synthetic model, antifeedants, 167
Spodoptera frugiperda, 167

T

Tabanus, emergence, 796
hover, 796
Taeniothrips inconsequens, *Acer saccharum*, 1118
forest soils, 1118
tannins, growth rates, 642
Lymantria dispar, 642
tarnished plant bug, strawberry, 1103

vacuum, 1103
temperature, *Apis mellifera*, 183
density, 971
Frankliniella occidentalis, 726
Musca domestica, 971
overwintering, 183
vapor pressure deficit, 726
temperature dependence, Colorado potato beetle larva, 784
feeding, 784
territories, foraging, 1113
Reticulitermes flavipes, 1113
Tetranychus kanzawai, dispersion, 21
mulberry, 21
Tetranychus urticae, *Frankliniella occidentalis*, 477
generalist predators, 477
Thrips tabaci, *Alternaria porri*, 1266
plant disease-insect interaction, 1266
toxic-bait dispensers, *Diabrotica* spp., 743
trapping, 743
transgenic cotton, genetically modified cotton, 1
plant resistance, 1
transgenic insect resistance, *Bacillus thuringiensis* subsp. HD-, 190
Populus, 190
transgenic plants, antifeedants, 334
Bacillus thuringiensis, 334
trapping, *Diabrotica* spp., 743
Dioryctria resinosella, 154
modeling, 33
sex pheromones, 154
stored-grain ecosystem, 33
toxic-bait dispensers, 743
tree hole, diurnal resting shelter, 613
Lutzomyia shannoni, 613
tri-trophic interactions, biological control, 238
host plant resistance, 238
Trialeurodes vaporariorum, *Bemisia tabaci*, 16
esterase banding patterns, 16
Trichogramma minutum, biological control, 1375
Malacosoma disstria, 1375
Trichogrammatoidea bactrae, life history, 1051
Pectinophora gossypiella, 1051
trunk, host preference, 134
Lymantria dispar, 134

U

understory, *Lamponius portoricensis*, 634
plant apparency, 634
Urophora affinis, supercooling, 831
Urophora quadrifasciata, 831
Urophora quadrifasciata, supercooling, 831
Urophora affinis, 831

V

Vaccinium macrocarpon, reproductive potential, 818
Rhopobota naevana, 818
vacuum, strawberry, 1103
tarnished plant bug, 1103
vapor pressure deficit, *Frankliniella occidentalis*, 726
temperature, 726
variogram, kriging, 1066
Lymantria dispar, 1066
vector propensity, *Aphis*, 1260
Myzus persicae, 1260
vegetation management, agroecosystem diversity, 519
natural enemy enhancement, 519
vertical transmission, epizootiology, 1031
Microsporidia, 1031

W

water loss, *Rhynchophorus cruentatus*, 93
water relations, 93
water relations, *Rhynchophorus cruentatus*, 93
water loss, 93
weed control, *Centaurea solstitialis*, 684
weevil, 684
weeds, *Aceria malherbae*, 234
Convolvulus arvensis, 234
weevil, *Centaurea solstitialis*, 684
weed control, 684
western corn rootworm, attractant, 654
Diabrotica virgifera virgifera, 654
wheat grain volatiles, insect pheromones, 965
Rhyzopertha dominica, 965
wireworms, bait stations, 1251
seedcorn maggot, 1251

X

Xanthium occidentale, biological control, 254
phytophagous insects, 254

Z

zoogeography, phytophage, 1146
Pistia stratiotes, 1146
Zoophthora phytonomi, *Bathyplectes* spp., 220, 674
Hypera postica, 220, 674